

10.5% Rule Amendments for Conventional Pollutants

Added 'Rules' to Footnote

- These criteria shall not be exceeded more than once for data sets containing less than 10 samples or more frequently than 10.5% for larger data sets.
- An exception to this is for the daily average dissolved oxygen criteria. The daily average has no allowable excursions and is calculated using 24 hour continuous monitoring data with a minimum of hourly concentrations taken over a diurnal cycle at the same depth.

Mock Assessment

Rules

- 5 Years Data (no estuary, lake or Chowan)
- 1-10 visits 1 violation not assessed
- Counted number of violations for each station
- Determined percent exceedence for each station (number of violations/total number of times DO measured)
- Counted number of stations with any % exceedence >10.5%
- Reported number of stations impaired

No Rules vs 10.5% Rule*

Number of Monitoring Locations (Stations) with Impairments

DO Viol Class III– IV	DO Viol Class III-IV
528	280

* Also 2 hit rule

No Rules vs 10.5% Rule*

Number of Monitoring Locations (Stations) with
Impairments

Temp Viol Class V	Temp Viol Class VI		Temp Viol Class V	Temp Viol Class VI
45	39		23	24

* Also 2 hit rule

No Rules vs 10.5% Rule*

Number of Monitoring Locations (Stations) with
Impairments

pH Viol Class II – VI	pH Class II - VI
563	194

* Also 2 hit rule

Amendments for Bacteria

Bacteria Amendments

- Deletion of Fecal Coliform
- 10.5% Rule
- New Geo Means and SSM
- Clarifying SSM Calculation
- CSO Amendment James River
- Disinfection Policies Recreation and Shellfish

9 VAC 25-260-170. Bacteria; other Recreational waters.

A. In surface waters, except shellfish waters and certain waters identified in subsections B and C of this section, the following bacteria criteria (CFU/100 ml) shall apply to protect primary contact recreational uses:

1. ~~Fecal coliform bacteria shall not exceed a geometric mean of 200 fecal coliform bacteria per 100 ml of water for two or more samples over a calendar month nor shall more than 10% of the total samples taken during any calendar month exceed 400 fecal coliform bacteria per 100 ml of water. This criterion shall not apply for a sampling station after the bacterial indicators described in subdivision 2 of this subsection have a minimum of 12 data points or after June 30, 2008, whichever comes first.~~

9 VAC 25-260-170. Bacteria; other Recreational waters.

	Geometric Mean ¹		Single Sample Maximum ²	
Freshwater ^{3, 4}				
<i>E.coli</i>	126	<u>206</u>	235	<u>384</u>
Saltwater and Transition Zone ³				
enterococci	35		104	

The new freshwater criteria are based on new EPA guidance where these values are calculated from a risk level of 1% instead of .8% and results in protection of primary contact recreation and is acceptable under the Beach Rule.

Geometric Mean¹

¹ ~~For two or more samples~~ Calculated using all available data taken during any calendar month with a minimum of four samples

Single Sample Maximum²

² ~~No single sample maximum for enterococci and *E. coli* shall exceed a 75% upper one-sided confidence limit based on a site-specific log standard deviation. If site data are insufficient to establish a site-specific log standard deviation, then 0.4 shall be used as the log standard deviation in freshwater and 0.7 shall be as the log standard deviation in saltwater and transition zone. Values shown are based on a log standard deviation of 0.4 in freshwater and 0.7 in saltwater.~~

The single sample maximum shall not be exceeded more than once for data sets containing less than 10 samples or more frequently than 10.5% for larger data sets

No Rules vs 10.5% Rule*

Number of Monitoring Locations (Stations) with
Impairments

E.Coli Viol Class II - VI	Entero Viol Class II - VI		E.Coli Viol Class II - VI	Entero Viol Class II - VI
1059	678		734	518

* Also 2 hit rule

Impact of Bacteria Criteria on TMDL Reductions

Based on several case studies

Background

- Stakeholder concerns regarding bacteria criteria experienced in TMDL program to date:
- → Criteria considered too stringent, unattainable or addressing a non-existing risk or problem
- → Criteria are protective but not viewed as reasonable/attainable
 - Leads to resistance to implementation
 - Promotes challenges of criteria rather than water quality improvements

Typical Bacteria TMDL Reduction % (to meet current bacteria criteria at all times)

Stream	Straight Pipes	Livestock	Agricultural Runoff	Residential/Urban Runoff	Wildlife
Story Creek	100	100	100	100	45
Snow Creek	100	60	95	95	0
Lower Pigg River	100	100	100	100	30
Chestnut Creek	100	65	98	98	0
Northeast Creek	100	100	100	100	92
Hogue Creek	100	100	100	100	99
Cub Creek	100	100	95	95	70

Background, cont.

- Goal: protect primary contact recreation use for as many streams as possible
- Goal: balance the defined health risk with the likelihood of attaining primary contact status
 - Stakeholders need to accept goals as reasonable and attainable as well as protective

Background, cont.

- Need: Analysis of several bacteria TMDLs to evaluate impact of different criteria combinations on reductions needed to meet these criteria

Criteria Selected for Review

Risk Level (% of swimmers)	Geometric Mean Density (per 100 mL)	Single sample maximum (per 100 mL)			
		Designated beach area (upper 75% C.L.)	Moderate full body contact (upper 82% C.L.)	Lightly used full body Contact (upper 90% C.L.)	Infrequently used full body contact (upper 95% C.L.)
0.8	126	235	298	409	575
0.9	161	301	382	523	736
1.0	206	385	489	668	940
secondary	630	1175	1475	2045	2875

Scenarios requested

- Criteria (in cfu/100ml):
 - Risk 8 GM **126** and high use SSM **235** (current)
 - Risk 8 GM **126** and moderate use SSM **298**
 - Risk 10 GM **206** and high use SSM **385**
 - Risk 10 GM **206** and moderate use SSM **489**
- Compliance:
 - 100% GM and 90 % SSM
 - 90% GM and 90% SSM

Reductions requested

- Eliminate failing septic systems and straight pipes
- Maximize reductions from livestock in streams
- Minimize reductions from overland sources
- Avoid reductions from wildlife sources

Streams analyzed

- Pigg River – BSE
 - Two main stem (Upper and Lower Pigg River), 2 tributaries (Snow Creek and Story Creek)
- Chestnut Creek – Maptech
- Northeast Creek - ECI
- Hogue Creek – DEQ (draft TMDL)
- Cub Creek – Louis Berger

Results for Pigg River

		Straight pipes	Livestock	Agric. runoff	Residen- tial runoff	Wildlife
<u>GM 100%, SSM100%</u>	Risk 8 GM 126, SSM 235 (current)	100	100	100	100	15
<u>GM 100%, SSM 90%</u>	Risk 8 GM 126, SSM 235	100	100	100	100	15
	Risk 8 GM 126, SSM 298	100	100	100	100	15
<u>GM 90%, SSM 90%</u>	Risk 8 GM 126, SSM 235	100	95	0	0	0
	Risk 8 GM 126, SSM 298	100	95	0	0	0
<u>GM 100%, SSM 90%</u>	Risk 10 GM 206, SSM 385	100	80	0	0	0
	Risk 10 GM 206, SSM 489	100	80	0	0	0
<u>GM 90%, SSM 90%</u>	Risk 10 GM 206, SSM 385	100	70	0	0	0
	Risk 10 GM 206, SSM 489	100	70	0	0	0

Results for Chestnut Creek

		Straight pipes	Livestock	Agric. runoff	Residen- tial runoff	Wildlife
<u>GM 100%, SSM 100%</u>	Risk 8 GM 126, SSM 235 (current)	100	65	98	98	0
<u>GM 100%, SSM 90%</u>	Risk 8 GM 126, SSM 235	100	65	87	87	0
	Risk 8 GM 126, SSM 298	100	77	81	81	0
<u>GM 90%, SSM 90%</u>	Risk 8 GM 126, SSM 235	100	36	90	87	0
	Risk 8 GM 126, SSM 298	100	41	82	83	0
<u>GM 100%, SSM 90%</u>	Risk 10 GM 206, SSM 385	100	0	76	78	0
	Risk 10 GM 206, SSM 489	100	0	67	69	0
<u>GM 90%, SSM 90%</u>	Risk 10 GM 206, SSM 385	100	0	76	78	0
	Risk 10 GM 206, SSM 489	100	0	67	69	0

Results for Northeast Creek

		Straight pipes	Livestock	Agric. runoff	Residen- tial runoff	Wildlife
GM 100%, SSM100%	Risk 8 GM 126, SSM 235 (current)	100	100	100	100	92
GM 100%, SSM 90%	Risk 8 GM 126, SSM 235	100	95	92	100	92
	Risk 8 GM 126, SSM 298	100	95	92	100	92
GM 90%, SSM 90%	Risk 8 GM 126, SSM 235	100	76	76	76	0
	Risk 8 GM 126, SSM 298	100	77	67	67	0
GM 100%, SSM 90%	Risk 10 GM 206, SSM 385	100	98	86	100	86
	Risk 10 GM 206, SSM 489	100	98	86	100	86
GM 90%, SSM 90%	Risk 10 GM 206, SSM 385	100	52	52	52	0
	Risk 10 GM 206, SSM 489	100	41	41	41	0

Results for Hogue Creek

		Straight pipes	Livestock	Agric. runoff	Residen- tial runoff	Wildlife
GM 100%, SSM100%	Risk 8 GM 126, SSM 235 (current)	100	100	100	100	99
GM 100%, SSM 90%	Risk 8 GM 126, SSM 235	100	100	100	100	20
	Risk 8 GM 126, SSM 298	100	100	100	100	20
GM 90%, SSM 90%	Risk 8 GM 126, SSM 235	100	80	85	85	0
	Risk 8 GM 126, SSM 298	100	70	80	80	0
GM 100%, SSM 90%	Risk 10 GM 206, SSM 385	100	100	50	50	0
	Risk 10 GM 206, SSM 489	100	100	50	50	0
GM 90%, SSM 90%	Risk 10 GM 206, SSM 385	100	65	70	70	0
	Risk 10 GM 206, SSM 489	100	60	55	55	0

Results for Cub Creek

		Straight pipes	Livestock	Agric. runoff	Residen- tial runoff	Wildlife
<u>GM 100%, SSM 100%</u>	Risk 8 GM 126, SSM 235 (current)	100	100	95	95	70
<u>GM 100%, SSM 90%</u>	Risk 8 GM 126, SSM 235	100	100	95	95	45
	Risk 8 GM 126, SSM 298	100	100	95	95	45
<u>GM 90%, SSM 90%</u>	Risk 8 GM 126, SSM 235	100	100	95	95	0
	Risk 8 GM 126, SSM 298	100	100	88	95	0
<u>GM 100%, SSM 90%</u>	Risk 10 GM 206, SSM 385	100	100	94	95	0
	Risk 10 GM 206, SSM 489	100	100	94	95	0
<u>GM 90%, SSM 90%</u>	Risk 10 GM 206, SSM 385	100	100	80	95	0
	Risk 10 GM 206, SSM 489	100	100	66	95	0

Findings

- No consistent significant change in reductions resulting from
 - SSM use change only
 - 90% SSM compliance rate only
 - GM change needed to result in more meaningful and workable reductions

Discussion

- Justification for Risk 10 illness rate?
 - EPA Beach Rule Guidance
 - Protective of Primary Contact
 - Current Risk 19 illness rate for marine waters

Summary

- o Change the SSM to 90% compliance
- o Change the GM to Risk 10 with 100% compliance (also results in adjustment of SSM)
- Primary contact recreation use can likely be attained in the large majority of VA streams (high frequency use!)
- Stakeholders would more easily accept target levels as reasonable and workable, resulting in more implementation

9 VAC 25-260-170. Bacteria; other Recreational waters.

	Geometric Mean ¹		Single Sample Maximum ²	
Freshwater ^{3, 4}				
<i>E.coli</i>	126	<u>206</u>	235	<u>384</u>
Saltwater and Transition Zone ³				
enterococci	35		104	

³ Two or more excursions for data sets containing less than 10 samples or greater than 10.5% excursions for larger data sets are required before a water body is listed as impaired under §§ 62.1-44.19:5 and 7 of the Code of Virginia

The new freshwater criteria are based on new EPA guidance where these values are calculated from a risk level of 1% instead of .8% and results in protection of primary contact recreation and is acceptable under the Beach Rule.

Richmond CSO Special Standard

- LTCP works with new statewide geo mean for freshwater
- LTCP problem remains with SSM which can't be met
- Special standard specifies geo mean only applies when sufficient data exists
- SSM for beach advisories and when insufficient data exists
- DEQ does not collect 4 samples / month for geo mean

9 VAC 25-260-170. Bacteria; Recreational waters.

Freshwater ⁴

⁴ See 9 VAC 25-260-310 for site-specific bacteria criteria that supersede these requirements.

9 VAC 25-260-310. Special standards and requirements.

cc. The geometric mean of *E. coli* 206 (CFU/100 ml) shall apply to the James River from Huguenot Bridge to its confluence with Falling Creek to protect primary contact recreation. The geometric mean shall be calculated from all available data taken during any calendar month when a minimum of four samples are available for each monitoring location. The single sample maximum of 384 (CFU/100ml) shall be used in these waters at all times for swimming advisories and closures and only for other Clean Water Act purposes when there is insufficient data to calculate a geometric mean.

Disinfection Requirements Recreation and Shellfish

Permit Limits for Bacteria

Disinfection Requirements Recreation

- Delete Disinfection Policy
 - Add No Mixing Zone for enterococci and *E. coli*
 - Existing permit guidance specifies disinfection (bacteria or chlorine) and monitoring requirements
- Delete disinfection waiver
 - Correctly falls under a UAA or variance

9 VAC 25-260-170. Bacteria; Recreational waters.

~~B. Notwithstanding the above, all sewage discharges shall be disinfected to achieve the applicable bacteria concentrations in subsection A 2 of this section prior to discharge.~~

~~However, the board, with the advice of the State Department of Health, may determine that reduced or no disinfection of a discharge is appropriate on a seasonal or year-round basis. In making such a determination, the board shall consider the designated uses of these waters and the seasonal nature of those uses. Such determinations will be made during the process of approving, issuing, or reissuing the discharge permit and shall be in conformance with a board approved site-specific use-attainability analysis performed by the permittee. When making a case-by-case determination concerning the appropriate level of disinfection for sewage discharges into these waters, the board shall provide a 45-day public notice period and opportunity for a public hearing.^[1]~~

Disinfection Requirements

Shellfish

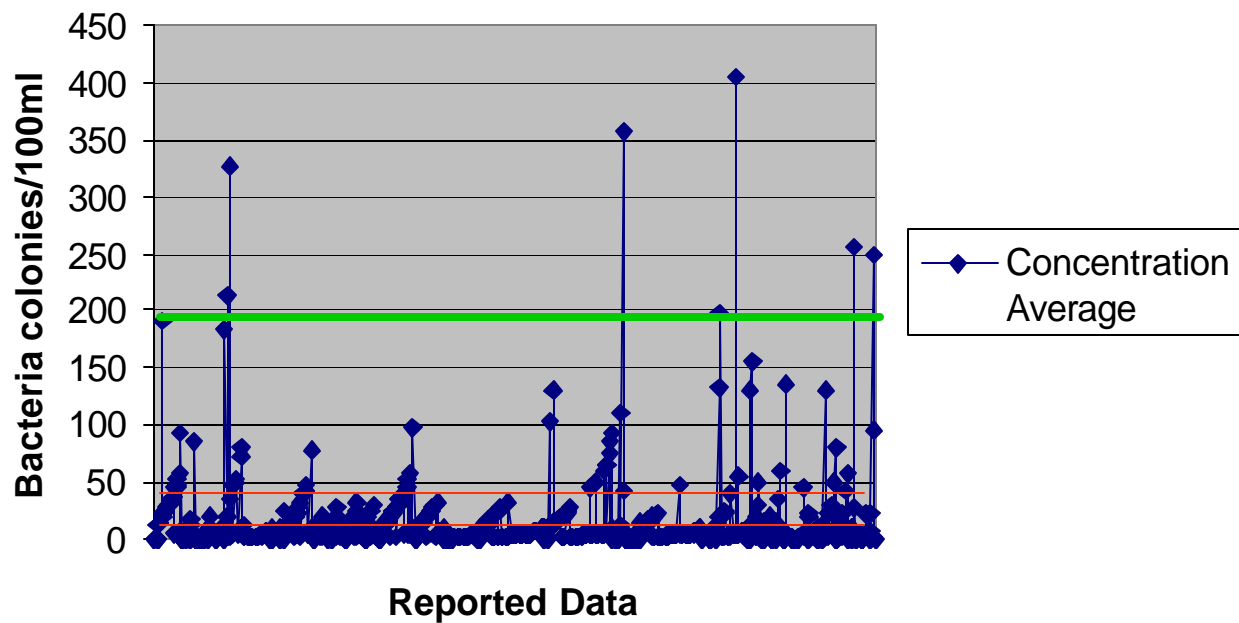
- Permittees must have enterococci limits
- Permittees must have fecal coli limits
- Currently use 200 fecal coli end of pipe
- Condemnation zones prevent direct harvest – de facto mixing zone
- Most other shellfish states do not allow mixing zones shellfish waters - end of pipe 14/100 or max approx 50.
- Shellfish fecal coli criteria are currently used by DSS for condemnations and DEQ outside of condemnation zones for TMDLs NOT permits
- 14 NOT met now at various municipal facilities
- Real issue is viruses and disinfection does not kill all viruses

Other States

Shellfish Permit Limits

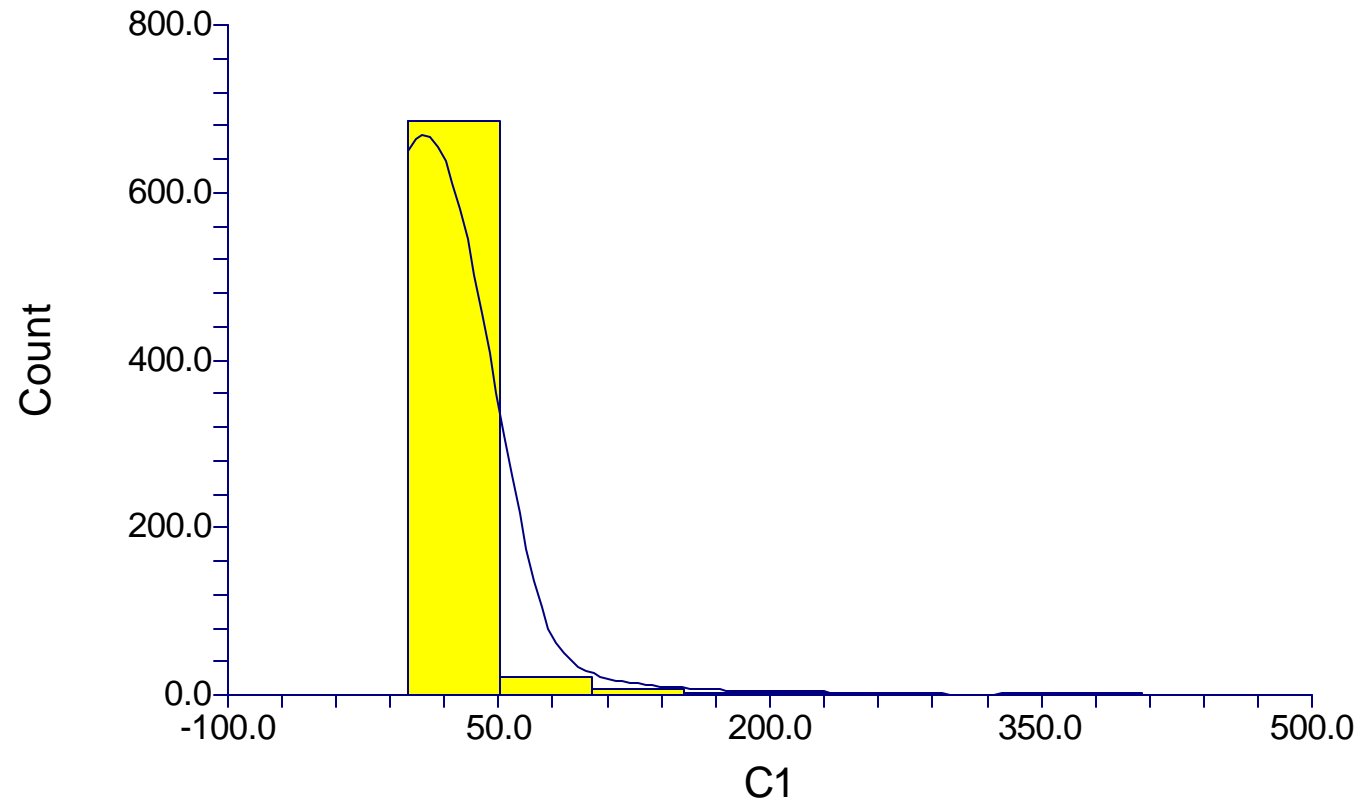
- MD 14 in shellfish waters end of pipe
- MA prevent MZ in productive shellfish beds (open beds WQS = 14 and 43 and relay WQS = 88 and 260)
- NJ no MZ in shellfish harvesting areas (WQS = 14 and 43)
- CT Classification for direct shellfish harvest (WQS = 14 and 43) and indirect shellfish harvest (relay WQS = 88 and 260)
- NH 14 growing or taking shellfish waters
- Puget Sound 200 g.m. and 400 weekly g.m.
- FLA – no mixing zones in shellfish harvesting areas (WQS = 14 and 43 nor 800 on any day)
- ME 15 colonies/100 ml as a monthly average (geometric mean) and 50 colonies/100 ml as a daily maximum end of pipe
- DE 35 enterococci end of pipe (no longer using fecal for permits to shellfish waters) Shellfish staff says 14 end of pipe

Fecal Coliform Effluent Data from Class II Shellfish Waters Municipal Permits



Distribution of Fecal Coliform Effluent Data

Histogram of C1



9 VAC 25-260-160. Fecal coliform bacteria; shellfish waters.

A. In all open ocean or estuarine waters capable of propagating shellfish or in specific areas where public or leased private shellfish beds are present, and including those waters on which condemnation or restriction classifications are established by the State Department of Health, the following criteria for fecal coliform bacteria shall apply:

The geometric mean fecal coliform value for a sampling station shall not exceed an MPN (most probable number) of 14 per 100 milliliters. The 90th percentile shall not exceed an MPN of 43 for a 5-tube, 3-dilution test or 49 for a 3-tube, 3-dilution test.

Option 1

B. All sewage discharges to shellfish waters where a condemnation zone has been established by the Virginia Department of Health per § 28.2-807 of the Code of Virginia on or before June 30, 2008, shall be disinfected to achieve a geometric mean fecal coliform bacteria concentration of 200 per 100 milliliters because no direct harvest of shellfish is allowed in these areas. All other discharges and new and expanded dischargers shall meet the geometric mean criteria in subsection A of this section.

Option 2

B. All sewage discharges to shellfish waters shall meet the geometric mean criteria in subsection A of this section.

Option 3

No amendments – default will be 14 mean and 49 max.

9 VAC 25-260-270. Shellfish buffer zones; public hearing.

Before acting on any proposal for a project that, while not contravening established numeric criteria for shellfish waters, would result in condemnation by the State Health Department of shellfish beds, the board shall convene a public hearing to determine the socio-economic effect of the proposal. Such proposals include discharge of treated waste or proposals to otherwise alter the biological, chemical or physical properties of state waters. If the Marine Resources Commission or the Virginia Institute of Marine Science certify that the project would have no effect on the shellfish use now and in the foreseeable future, the board may dispense with such hearing.

When the board finds that the proposed project will result in shellfish bed condemnation and if the condemnation will violate the general standard, it shall disapprove the proposal.